

563. (currently amended) A process for the production of a polyolefin having at least 50 branches per 1000 methylene groups and at least two branches of different lengths containing less than 6 carbon atoms each, comprising the step of polymerizing one or more monomers of the formula $H_2C=CH(CH_2)_eG$, wherein

G is hydrogen or $-CO_2R^1$,

e is 0 or an integer of 1 to 20,

R^1 is hydrogen, hydrocarbyl or substituted hydrocarbyl, and

in at least 50 mole percent of said monomers G is hydrogen,

by contacting said one or more monomers with a transition metal containing coordination polymerization catalyst under polymerizing conditions such that in said polyolefin:

(i) the number of branches per 1000 methylene groups is 90% or less than the number of theoretical branches per 1000 methylene groups, or

(ii) the number of branches per 1000 methylene groups is 110% or more of theoretical branches per 1000 methylene groups; or

(iii) when there should be no branches theoretically present, said polyolefin has 50 or more branches per 1000 methylene groups

~~wherein said transition metal is Ni or Pd.~~

564. (original) The process as recited in claim 563, wherein said one or more monomers are contacted with said transition metal containing coordination polymerization catalyst under polymerizing conditions such that in said polyolefin:

(i) the number of branches per 1000 methylene groups is 80% or less than the number of theoretical branches per 1000 methylene groups, or

(ii) the number of branches per 1000 methylene groups is 120% or more of theoretical branches per 1000 methylene groups; or

(iii) when there should be no branches theoretically present, said polyolefin has 75 or more branches per 1000 methylene groups.

565.(currently amended) A process for the production of a polyolefin having at least 50 branches per 1000 methylene groups and at least two branches of different lengths containing

less than 6 carbon atoms each, comprising the step of polymerizing one or more monomers of the formula $\text{H}_2\text{C}=\text{CH}(\text{CH}_2)_e\text{G}$, wherein

G is hydrogen or $-\text{CO}_2\text{R}^1$,

e is 0 or an integer of 1 to 20,

R^1 is hydrogen, hydrocarbyl or substituted hydrocarbyl, and

in at least 50 mole percent of said monomers G is hydrogen,

by contacting said one or more monomers with a transition metal containing coordination polymerization catalyst under polymerizing conditions such that in said polyolefin:

- (1) there are at least 50 branches of the formula $-(\text{CH}_2)_f\text{G}$ per 1000 methylene groups, wherein $e \neq f$, and/or
- (2) for any single monomer of the formula $\text{H}_2\text{C}=\text{CH}(\text{CH}_2)_e\text{G}$ there are
 - (a) less than 90% of the number of theoretical branches per 1000 methylene groups of the formula $-(\text{CH}_2)_f\text{G}$ and $f=e$, or
 - (b) more than 110% of the theoretical branches per 1000 methylene groups of the formula $-(\text{CH}_2)_f\text{G}$ and $f=e$

~~wherein said transition metal is Ni or Pd.~~

566.(original) The process as recited in claim 565 wherein said one or more monomers are contacted with a transition metal containing coordination polymerization catalyst under polymerizing conditions such that in said polyolefin:

- (1) there are at least 50 branches of the formula $-(\text{CH}_2)_f\text{G}$ per 1000 methylene groups, wherein $e \neq f$, and/or
- (2) for any single monomer of the formula $\text{H}_2\text{C}=\text{CH}(\text{CH}_2)_e\text{G}$ there are
 - (a) less than 80% of the number of theoretical branches per 1000 methylene groups of the formula $-(\text{CH}_2)_f\text{G}$ and $f=e$, or
 - (b) more than 120% of the theoretical branches per 1000 methylene groups of the formula $-(\text{CH}_2)_f\text{G}$ and $f=e$.

567.(original) The process as recited in claim 563, wherein said monomer is ethylene only.

568.(original) The process as recited in claim 564, wherein said monomer is ethylene only.

569.(original) The process as recited in claim 565, wherein said monomer is ethylene only.

570.(original) The process as recited in claim 566, wherein said monomer is ethylene only.

571.(original) The process as recited in claim 563, wherein said monomer is propylene only.

572.(original) The process as recited in claim 564, wherein said monomer is propylene only.

573.(original) The process as recited in claim 565, wherein said monomer is propylene only.

574.(original) The process as recited in claim 566, wherein said monomer is propylene only.